Claims

1. A method for combining an optical hologram (2) having a virtual content (H) with computer graphics (G) by using a semi-transparent optical element (3), a hologram (2), a display (5) on an optical element (3) side which is pointing away from an observer (V), and a video projector (P), wherein the holographic image of the hologram (H) appears overlayed with the picture of the display (5), characterized in that the hologram (2) is illuminated by an illumination image (I) projected by the video projector (P), and a holographic wavefront, visible for the observer (V), is reconstructed, and simultaneously a rendered computer graphics (R) rendered from the computer graphics (G) is displayed on the display (5).

2. The method according to claim 1, characterized in that, using the light (7) projected by the video projector (P) by means of the image (I) projected by it, the amplitude of the wavefront is modified in places.

3. The method according to claim 2, characterized in that parts of the holographic image are emphasized.

4. The method according to claim 1, 2 or 3, characterized in that, using the light (7) of the video projector (P) by means of the image (I) projected it, the wavefront is reconstructed in parts only.

5. The method according to claim 2, 3 or 4, characterized in that the computer graphics (G) is arranged in areas of the hologram content (H) that are not reconstructed or are only partially reconstructed.

6. The method according to claim 5, characterized in that, for computing the illumination image (I) and the computer graphics (R), a Z buffer, a stencil buffer and a frame buffer are used and

- a texture (T) is created off-axis from the perspective of the observer (V) by

a) clearing all buffers using black,

b) writing the hologram content (H) into the Z buffer and the frame buffer,

c) writing the graphics content (G) into the Z buffer and the stencil buffer using a Z buffer test,

d) clearing the stencils in the frame buffer using black;

- the illumination image (I) is created from the perspective of the video projector (P) by

a) clearing all buffers using black,

b) writing the image of the hologram (2), provided with the texture (T), into the frame buffer;

- the computer graphic (R) is created off-axis from the perspective of the observer (V) by

a) clearing all buffers using black,

b) writing the hologram content (H) into the Z buffer,

c) writing the graphics content (G) into the Z buffer and the frame buffer using a Z buffer test.

7. The method according to claim 5, characterized in that, for computing the illumination image (I) and the computer graphics (R), a Z buffer, a stencil buffer and a frame buffer are used and

- a texture (T) is created off-axis from the perspective of the observer (V) by

a) clearing the Z buffer and the stencil buffer using black and filling the frame buffer with predefined color values,

b) writing the hologram content (H) into the Z buffer,

c) writing the graphics content (G) into the Z buffer and the stencil buffer using a Z buffer test

d) clearing the stencils in the frame buffer using black

- the illumination image (I) is created from the perspective of the video projector (P) by

a) clearing all buffers using black,

b) writing the image of a white rectangle, provided with the texture (T), into the

frame buffer;

- the computer graphic (R) is created off-axis from the perspective of the observer (V) by

a) clearing all buffers using black

b) writing the hologram content (H) into the Z buffer

c) writing the graphics content (G) into the Z buffer and the frame buffer using a Z buffer test.

8. The method according to one of the preceding claims, characterized in that, by modifying the amplitude of the wavefront by means of the illumination image (I) of the video projector (P), the illumination situation of the holographic image is modified.

9. The method according to claim 8, characterized in that first the original illumination situation is computationally neutralized and then a new illumination image (I) is computed using a new illumination situation.

10. The method according to claim 9, characterized in that the new illumination image (I) is computed by

- computing two projections (i_1, i_2) of the hologram content (H) from the perspective of the video projector (P), wherein diffuse white material is used for the hologram content (H) and shading and/or shadow-mapping computations are performed

a) the first projection (i_1) is created using virtual light sources (L) causing approximately the same shadings on the hologram content (H) as the original light sources during hologram recording,

b) the second projection (i_1) is created using virtual light sources (N) causing the desired new illlumination situation;

- computing a third projection (i_3) of the hologram (2) from the perspective of the video projector (P), wherein diffuse, white material is used for the hologramm and a point light source at the location of the projector is taken into account;

- computing the ratio of the ratios of the second (i_2) and the first (i_1) projection and the third projection (i_3).

11. The method according to claim 8, 9 or 10, characterized in that the computer graphic (R), as to the light effects, is rendered in correspondance with the modified illumination situation of the wavefront.

12. The method according to one of the preceding claims, characterized in that, by a detection facility, the head and/or eye position of the observer (V) is measured and incorporated into the computation of the computer graphics (R) and/or of the illumination image (I) of the video projector (P).

13. The method according to one of the preceding claims, characterized in that the hologram (2) is protected and/or stabilized by an optically transparent layer (1).

14. The method according to one of the preceding claims, characterized in that the computer graphics (R) is created stereoscopically, autostereoscopically or monoscopically.

15. The method according to one of the preceding claims, characterized in that the computer graphics (R) is created stereoscopically and appears to be three-dimensional to the observer (V) through a lenticular lens sheet (4) arranged between him and the display (5).

16. An arrangement for combining an optical hologram (2) having a virtual content (H) with computer graphics (G), comprising a semi-transparent optical element (3), a hologram (2), a display (5) on an optical element (3) side which is pointing away from an observer (V), a video projector (P), in particular for performing a method according to one of the claims 1 to 12, characterized in that the video projector (P) illuminates the hologram (2) by an illumination

image (I) projected by it, wherein the hologram (2) is arranged between the observer (V) and the display (5) on which computer graphics (R) is displayable.

17. The arrangement according to claim 16, characterized in that a lenticular lens sheet (4) is arranged between the display (5) and the semi-transparent element (3).

18. The arrangement according to claim 16 or 17, characterized in that the head and/or eye position of an observer (V) is detectable by a detection facility.

19. The arrangement according to claim 16, characterized in that the detection facility is a head-finder.

20. The arrangement according to one of the preceding claims, characterized in that an optically transparent layer (1) is arranged at the hologram (2).

21. The arrangement according to one of the preceding claims, characterized in that the hologram (2) is a reflection hologram without darkening layer and is itself the semi-transparent element (3).